

## CLAIMS

What is claimed is:

1. A method for soldering plastic flex circuits by diode laser, said method comprising the steps of:
  - 5 providing at least a first flex circuit and a second flex circuit composed of polymer flex substrate, each having a top and a bottom side, and each with at least one contact trace embedded therein;
  - providing an area of solder on said at least one contact trace of at least one of said first flex circuit or said second flex circuit;
  - 10 positioning said first flex circuit and said second flex circuit such that said at least one contact trace of each flex circuit are in substantial alignment; and
  - positioning at least one laser beam to heat said at least one contact trace to melt said solder and fuse said contacts.
- 15 ~~2. The method of claim 1, wherein said laser beam moves across said flex circuits.~~
3. The method of claim 2, wherein said contact traces are copper traces.
4. The method of claim 3, wherein said solder is in the form of a solder paste.
5. The method of claim 4, wherein said laser beam is a diode laser approximately near the infrared spectrum.
6. The method of claim 5, wherein said laser beam has a substantially rectangular shape.

7. The method of claim 6, wherein said polymer flex substrate of at least one of said first and said second flex circuits is substantially transparent to light near the infrared spectrum.

8. The method of claim 7, further comprising a solder mask covering a portion of said at least one copper trace on said bottom side of said first flex circuit and covering a portion of said at least one copper trace on said top side of said second flex circuit.

9. The method of claim 8, wherein said area of solder paste is not covered by solder mask.

10. The method of claim 9, wherein said beam heats said at least one copper trace at a point within said focal point of said beam.

11. The method of claim 10, wherein said copper traces are heated by said beam causing said solder paste to reflow.

12. The method of claim 11, wherein said copper trace of said first flex circuit and said copper trace of said second flex circuit are fused together by said solder after reflow.

13. The method of claim 11, wherein said beam remains parallel to said at least one copper trace.

14. The method of claim 11, wherein said beam is angled in relation to said at least one copper trace.

15. The method of claim 11, wherein at least two beams arranged parallel to each other are utilized.

16. A method for soldering plastic flex circuits by using a laser, said method comprising the steps of:

providing at least a first flex circuit and a second flex circuit composed of polymer flex substrate, each having a top and a bottom side, and each with at least one contact trace embedded therein;

providing a layer of solder on said at least one contact trace of at least one of said first or said second flex circuits;

positioning said first flex circuit and said second flex circuit such that said at least one contact trace of each flex circuit are in substantial alignment;

positioning at least one laser beam at a point relative to said first flex circuit and said second flex circuit; and

moving said at least one laser beam from said point across said flex circuits over said contact traces to cause said solder to reflow and fuse said contact traces.

17. The method of claim 16, wherein said layer of solder is in the form of a preform placed on said contact trace.

18. The method of claim 16, wherein said layer of solder is plated onto said contact trace.

19. The method of claim 18, wherein a layer of flux is applied on said layer of solder plated on said at least one contact trace.

20. ~~The method of claim 19, wherein a layer of solder is plated on each of said contact traces.~~

21. A method for soldering plastic flex circuits, said method comprising the steps of:

providing a first plastic substrate and a second plastic substrate, each with a top side and a bottom side;

laminating at least one first contact trace to said bottom side of said first plastic substrate;

laminating at least one second contact trace to said top side of said second plastic substrate;

5 aligning said first plastic substrate and said second plastic substrate such that said at least one first contact trace and said at least one second contact trace are substantially aligned and form an alignment area;

applying a layer of solder to said at least one first contact trace within said alignment area;

10 positioning at least one laser at a point relative to said first plastic substrate and said second plastic substrate; and

moving said at least one laser from said point across said first plastic substrate and said second plastic substrate such that the beam of said laser heats at least a portion of said at least one first contact trace to cause said solder to reflow and fuse said contact traces.

15 22. The method of claim 21, wherein said beam continues to move after heating said at least one first contact trace.

23. The method of claim 22, wherein said beam of said diode laser has a substantially rectangular shape.